



**5th SPIRE
Brokerage event**

21 September 2017

**TO THE CE-SPIRE-02-2018
CALL**

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LAPPEENRANTA UNIVERSITY OF TECHNOLOGY, LUT FINLAND

Clean energy and water, circular economy and sustainable business are the key questions of humankind to which LUT seeks solutions through technology and business.

CLEAN ENERGY

- Energy markets and solar economy
- Energy conversion and storage technologies
- Sustainability science

SUSTAINABLE BUSINESS AND ENTREPRENEURSHIP

- Innovation and sustainable value creation
- SMEs and international entrepreneurship
- Business analytics and decision-making
- Digitalisation of businesses

CIRCULAR ECONOMY

- Water purification and reuse
- Processing of secondary and renewable raw materials
- Products and life cycle assessment

CROSS-CUTTING THEMES

- Digitalisation and data science
- Focus area research in the Russian context and with the best Russian partners

LUT in Numbers

- Founded in 1969
- Around 5000 students
- 900 staff
- Three schools combining technology and business
- 40% external funding from the budget
- 50-60 inventions reported annually
- 23 patent applications in 2015, more than in any other Finnish university
- 4-5 research startups a year
- Tens of globally used products originally stem from LUT research: e.g. ABB's electrical drives products, KONE Elevators hoisting products, Wärtsilä's distributed power generation products
- Examples of spin-off companies: AXCO-Motors, Mevea, Visedo

PROJECT IDEA

How to challenge Scope of the call

- A) Show potential for integration in a renewable electricity grid, and consider the relevant limitations (fluctuating nature of the electricity stream).
- B) Provide improved flexibility, working at variable throughputs without major losses in the overall process performance.
- C) Be applicable to continuous processes and/or show potential enabling the replacement of current batch ones.
- D) Consider, where relevant, the possibility for containerised and/or mobile (e.g. biomass in situ processing) technologies.
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PROJECT IDEA

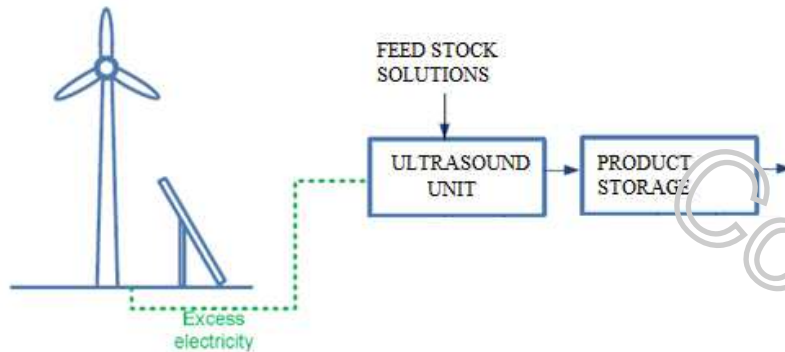
How to challenge Scope

The manufacturing is situated in a container which is connected to the renewable energy grid. Solar panels and wind energy is used for electricity production.

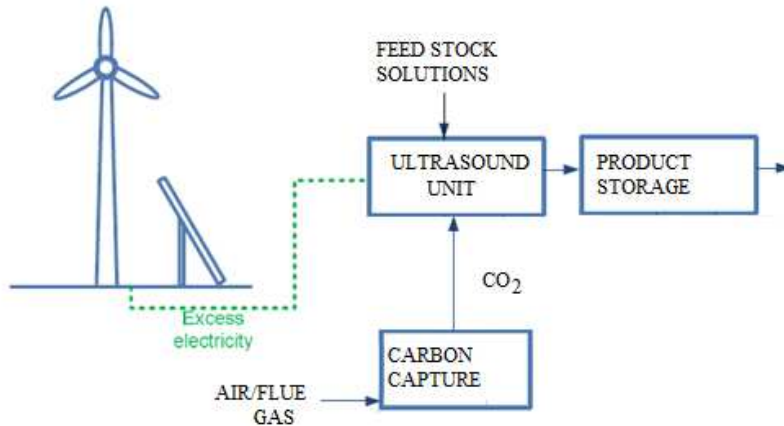
The manufacturing applications are extraction of natural products and precipitated calcium carbonate (PCC) production of different particle qualities. Starting materials are carbon dioxide and calcium hydroxide. Continuous ultrasound assisted processing is the key technology in this research proposal. Typically ultrasound assisted extraction (UAS) provides X % higher yields to traditional extraction technologies. Calcium carbonate precipitation using ultrasound enables milling cost minimization due to the particle size control under ultrasound field. Variable production rates can be run for the proposed applications. Localized production is easy to manage with proposed production units.

Proposed production demonstrations

ULTRASOUND ASSISTED EXTRACTION



PRECIPITATED CALCIUM CARBONATE



Proposed research relates to

- LUT REFLEX Recycling carbon in a flexible competitive energy system RESEARCH PLATFORM, Power-to-X validation runs going on <http://www.lut.fi/web/en/research/platforms/reflex>
- LUT LENS Processes research on continuous ultrasound crystallization (SONO project funded by TEKES www.tekes.fi)



LOOKING FOR PARTNERS

Please use 1 slide to indicate the profile of the partners you are looking for and their envisioned role. If you are looking for SMEs, please indicate specific technological areas

Confidential

CONTACT DETAILS



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**LUT PACKAGING TECHNOLOGY
-LOOKING FOR A CONSORTIUM**

*Dr. Ville Leminen
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LAPPEENRANTA UNIVERSITY OF TECHNOLOGY, FINLAND, LUT PACKAGING TECHNOLOGY

- One of global leaders in the field of 3D-forming (press-forming and thermoforming) of fibre-based packaging materials
- Research philosophy: Material development and machine and process development are done in cooperation – both have an effect on each other and offer a synergy advantage in research work
- Research funding consists of public funding (ERDF, Tekes etc.) and private industrial funding
- LUT Packaging Technology staff consists of mechanical engineers specialized in machinery and chemical engineers specialized in materials. The research group functions under the laboratory of production technology.
 - Staff size:
 - 2 professors (Juha Varis, Kaj Backfolk)
 - ~15 doctoral students / post. docs
 - In addition: technical staff and research assistants

COMPETENCE AREA AND POSSIBLE ROLES IN PROJECTS

Areas of expertise include:

- *Packaging machinery research and development, especially paperboard forming*
- *Converting of fibre-based packaging materials*
- *Tool design and manufacturing*
- *Sealing solutions for fibre-based materials*
- *Package quality control development*
- *Packaging material technology*
- *Coating and dispersion barriers*
- *Fibre engineering and technology*
- *Nanotechnology functional coatings*
- *Development of forming processes*
- *Development of biomaterials and coatings*

Especially to call CE-SPIRE-10-2018

CONTACT DETAILS



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